(Part-I)

2. Write short answers to any FIVE (5) questions: 10

(i) What is meant by time period?

Ans The time taken by a vibrating body to complete one vibration is called time period.

(ii) State Joule's law.

Ans The amount of heat generated in a resistance due to flow of charges is equal to product of square of current, resistance and time duration.

$$\text{Joule's law} = W = I^2Rt$$

(iii) What is difference between musical sound and noise?

Ans

Musical Sounds	Noise
"The sounds having pleasant effect on our ears are called musical sounds."	"The sounds which create jarring effect on our ears are called noise."
Examples:	Examples:
Sounds of musical instruments such as flute, violin, drum, etc.	Sound of traffic, sounds of machinery, etc.

(iv) What is audible frequency range?

Ans The range of the frequencies which a human ear can hear is called the audible frequency range.

(v)   Define intensity of sound.

Ans "Sound energy passing per second through a unit area held perpendicular to direction of propagation of sound waves is called intensity of sound."

(vi)   Define current and write its unit.

Ans **Current:**

The rate of flow of electric charge through any cross-sectional area is called electric current.

Its formula is:

$$I = \frac{Q}{t}$$

Unit: Its SI unit is Ampere (A).

(vii)   Define unit "Ohm".

Ans **Ohm:**

When a potential difference of one volt is applied across the ends of a conductor and one ampere of current passes through it, then its resistance will be one ohm.

(viii) What is the work of fuse?

Ans A fuse is a safety device that is connected in series with the live wire in the circuit to protect the equipments when excess current flows. If a large, unsafe current passes through the circuit, the fuse melts and breaks the circuit before the wire become very hot and cause fire.

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3.   Write short answers to any FIVE (5) questions: 10

(i)   If p = 6 cm, f = 10 cm mirror is concave, find q?

Ans According to the formula:

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

$$\frac{1}{q} = \frac{1}{f} - \frac{1}{p}$$

$$\frac{1}{q} = \frac{1}{10} - \frac{1}{6}$$

$$\frac{1}{q} = \frac{3-5}{30}$$

$$\frac{1}{q} = \frac{-2}{30}$$

$$\frac{1}{q} = \frac{-1}{15}$$

$$\boxed{q = -15 \text{ cm}}$$

(ii) **What is meant by critical angle.**

Ans The angle of incidence for which the angle of refraction becomes 90° is called critical angle.

(iii) **Write two uses of optical fibre.**

Ans Two uses of optical fibres are given below:

1. Optical fibres have become very important and are used in high-speed communications, such as cable TV and high-speed broadband services.

2. Optical fibres are well-suited for medical use. They can be made in extremely thin, flexible strands for insertion into the blood vessels, lungs and other hollow parts of the body.

(iv) **Define capacitance.**

Ans "Capacitance is a ratio between charge and potential difference applied across the plates of the capacitor." OR

"The ability of capacitor to store electric charge is called capacitance."

Unit: SI unit of capacitance is farad (F).

(v) **Define electrical potential.**

Ans It states as:

"Electric potential at a point in an electric field is equal to the amount of work done in bringing a unit positive charge from infinity to that point."

(vi) What is meant by telecommunication?

Ans "The method that is used to communicate information to far-off places instantly is called telecommunication."

(vii) What is meant by data management?

Ans To collect all information regarding a subject to store them in the computer in more than one interlinked files, which may help when needed, is called 'data management'.

(viii) Write two services of internet.

Ans Two services of internet are given below:

1. Web browsing -- This function allows users to view web pages.
2. E-mail -- Allows people to send and receive text messages.

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4. Write short answers to any Five (5) questions: 10

(i) State Fleming's left hand rule.

Ans Fleming's left hand rule stated as:

Stretch the thumb, forefinger and the middle finger of the left hand mutually perpendicular to each other. If the forefinger points in the direction of the magnetic field, the middle finger in the direction of the current, then the thumb would indicate the direction of the force acting on the conductor.

(ii) What is meant by step-down transformer?

Ans If in a transformer, the secondary voltage is smaller than the primary voltage, that is called step-down transformer.

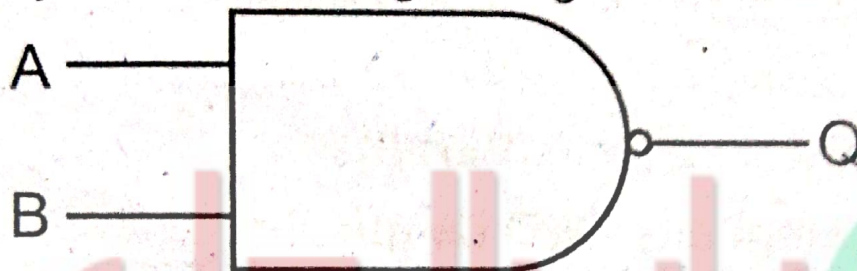**(iii)** Write the parts name of cathode ray oscilloscope.

Ans The different parts of a cathode-ray oscilloscope are:

1. The Electron Gun.
2. The Deflecting Plates.
3. A Fluorescent Screen.

(iv) **NAND is a universal gate, give its symbol and truth table.**

Ans **Symbol:**

The symbol of NAND gate is given below:

Truth table:

The truth table of NAND gate is given below:

A	B	$Q = \overline{AB}$
0	0	1
1	0	1
0	1	1
1	1	0

S_1	S_2	Q
OFF	OFF	ON
ON	OFF	ON
OFF	ON	ON
ON	ON	OFF

(v) **Define thermionic emission.**

Ans "The process of emission of electrons from hot metal surfaces is called the thermionic emission."

(vi) **What is meant by half-life of radioactive element?**

Ans The time during which half of the unstable radioactive nuclei disintegrate is called the half-life of the sample of radioactive element.

(vii) Define carbon dating.

Ans The age of a dead human, animal or tree can be estimated by comparing the activity of carbon-14 in the live and dead tree. This technique is called carbon dating.

(viii) Write two characteristics of β particles.

Ans The two characteristics of β-particles are given below:

1. β-particles can ionize the matter. β-particles ionize a gas much less than α-particle.

2. β-particles strongly interacts with matter due to its charge and has a short range as compared to γ radiations.

(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) What are mechanical waves? Describe its types with examples. (4)

Ans **Definition:**

Waves which require any medium for their propagation are called mechanical waves.

Types:

Depending upon the direction of displacement of medium with respect to the direction of the propagation of wave itself, mechanical waves may be classified as longitudinal or transverse.

Longitudinal wave:

In longitudinal waves, the particles of the medium move back and forth along the direction of propagation of wave.

Example:

Longitudinal waves can be produced on a spring, placed on a smooth floor. Fix one end of the slinky spring with a rigid support and hold the other end into your hand. Now give it a regular push and pull quickly in the direction of its length.

A series of disturbances in the form of waves will start moving along the length of the slinky spring. Such a wave consists of regions called compressions, where the loops of the spring are close together, alternating with regions called rarefactions. In the regions of compression, particles of the medium are closer together while in the regions of rarefaction, particles of the medium are spaced apart. The distance between two consecutive compressions is called wavelength. The compressions and rarefactions move back and forth along the direction of motion of the wave. Such a wave is called longitudinal wave.

Transverse wave:

In case of transverse wave, the vibratory motion of particles of the medium is perpendicular to the direction of propagation of waves.

Example:

We can produce transverse waves with the help of a slinky spring. Stretch out a slinky spring along a smooth floor with one end fixed. Grasp the other end of the slinky spring and move it up and down quickly. A wave in the form of alternate crests and troughs will start travelling towards the fixed end. The crests are the highest points

while the troughs are the lowest points of the particles of the medium from the mean position. The distance between two consecutive crests or troughs is called wavelength.

(b) An object 30 cm tall is located 10.5 cm from a concave mirror with focal length 16 cm. Find the location and height of the image. **(5)**

Ans For Answer see Paper 2017 (Group-II), Q.5.(b).

Q.6.(a) Explain one application and one hazard of static electricity. **(4)**

Ans **Application of Static Electricity:**

Electrostatic Air-Cleaner:

An electrostatic air cleaner is used in homes to relieve the discomfort of allergy sufferers. Air mixed with dust and pollen enters the device across a positively charged mesh. The airborne particles become positively charged when they make contact with the mesh. Then they pass through a second, negatively charged mesh. The electrostatic force of attraction between the positively charged particles in the air and the negatively charged mesh causes the particles to precipitate out on the surface of the mesh. Through this process, we can remove a very high percentage of contaminants from the air stream.

Hazard of static electricity:

Fires or Explosions:

Static electricity is a major cause of fires and explosions at many places. A fire or an explosion may occur due to excessive build-up of electric charges produced by friction.

Static electricity can be generated by the friction of the gasoline being pumped into a vehicle or container. It can also be produced when we get out of the car or remove an article of clothing. Static charges are dangerous. If static charges are allowed to discharge through the areas where there is petrol vapour, a fire can occur.

(b) By applying a potential difference of 10 V across a conductor, a current of 1.5 A passes through it. How much energy would be obtained from the current in 2 minutes? (5)

Ans Potential diff., V = 10 Volts

Current, I = 1.5 A

Energy = ?

Time, t = 2 min = 120 sec.

. 1 min. = 60 sec.

First we find resistance R = ?

By Ohm's law, $V = I R$

$$R = \frac{V}{I}$$

Putting values, we get $R = \frac{10}{1.5}$

$= R = 6.7 \, \Omega$

By Definition: $W = I^2 R t$

Putting values, we get $W = (1.5)^2 \times 6.7 \times 120$

$W = 1809$ joules

Q.7.(a) Explain in detail about compact disc and flash drive. (4)

Ans **Compact Disc (CDs):**
This is based on laser technology. It is a molded plastic disc on which digital data is stored in the form of

microscopic reflecting and non-reflecting spots, which are called "pits" and "lands", respectively. Pits are the spiral tracks encoded on the top surface of CD and lands are the areas between pits. A fine laser beam scans the surface of the rotating disk to read the data. Pits and lands reflect different amount of the laser light falling on the surface of CD. This pattern of different amount of the light reflected by the pits and the lands is converted into binary data. The presence of pit indicates '1' and absence of pit indicates '0'.

A CD can store over 680 megabyte of computer data. A DVD, the same size as traditional CD, is able to store up to 17 gigabytes of data.

Flash Drive:

It is also an electronic-based device and consists of data storage ICs. A flash drive is a small storage device that can be used to transport files from one computer to another. They are slightly larger than a stick of gum, yet many of these devices can carry all your homework for an entire year! We can keep one on a key chain, carry it around our neck, or attach it to our book bag.

A flash drive is easy to use. Once we have created a paper or other work, we can simply plug our flash drive into a USB port. We must make a backup of our created paper or project on our flash drive and save it separate from our computer. A flash drive will also come in handy, if you are able to print out homework at school. You can write a paper at home, save it to your flash drive, and then plug the drive into a USB port on a school computer.

(b) Ashes from a campfire deep in a cave show carbon-14 activity of only one-eighth the activity of fresh wood. How long ago was that campfire made? (4)

Ans We know half-life of C-14 is $T_{1/2}$ = 5730 years

Since the ratio has been reduced by 1/8 (one-eighth).

Therefore, three half-lives have passed.

The age of the fossile is given by first half-life

$$T_{1/2} = 5730 \text{ years}$$

Age of the fossile is given by after 2nd half-life

$$2 \times T_{1/2} = 2 \times 5730 = 11460 \text{ years}$$

Age of the fossile is given by after 3rd half-life

$$3 \times T_{1/2} = 3 \times 5730 = 17190 \text{ years}$$